

Autism Spectrum Disorders

July 31, 2018

State Council on Developmental Disabilities

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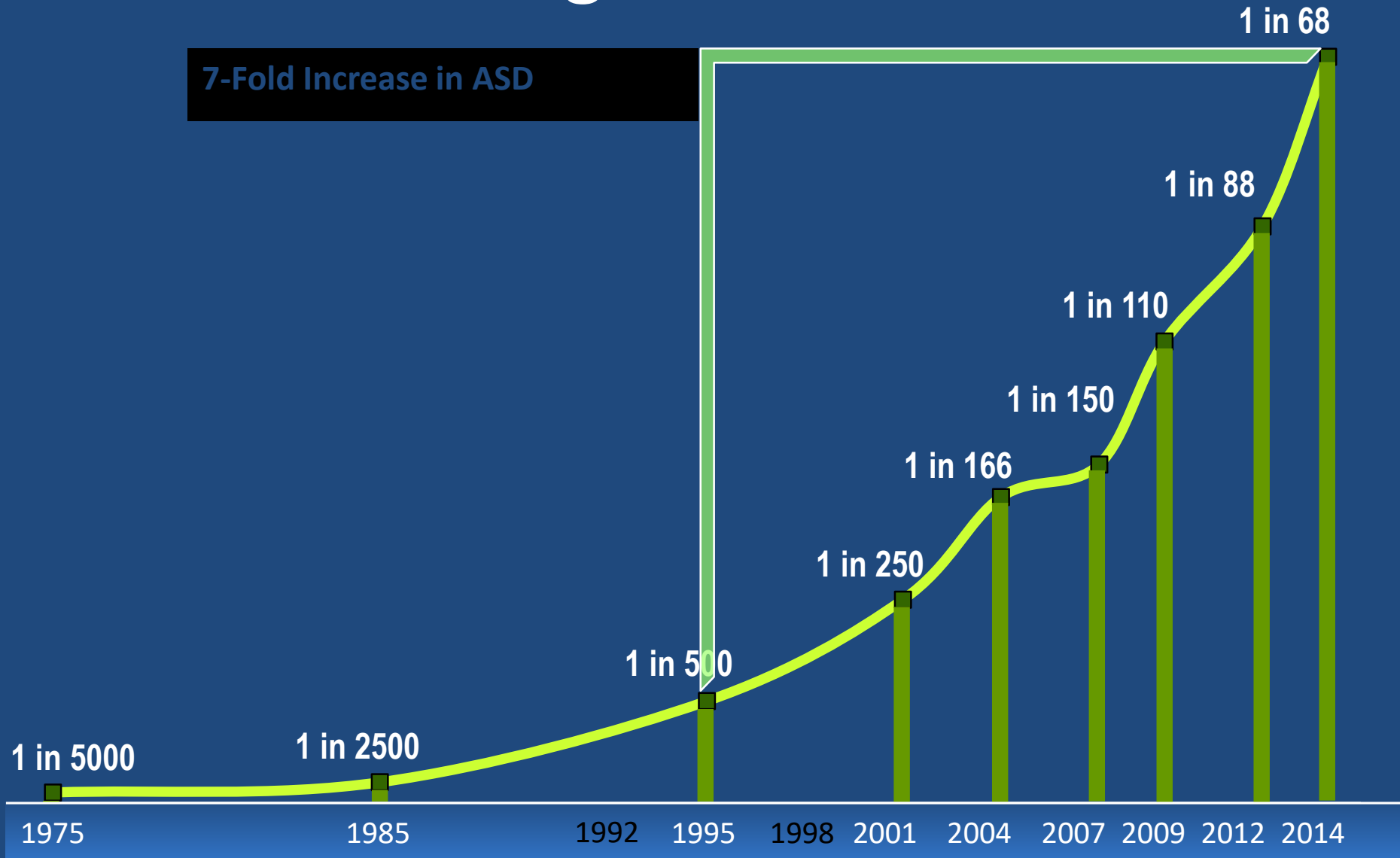
Outline

- ASD prevalence
- ASD diagnosis
- Causes of ASD
- Comorbidities
- Treatment
- Research



Rising Prevalence

7-Fold Increase in ASD



Adapted Figure from Autism Speaks

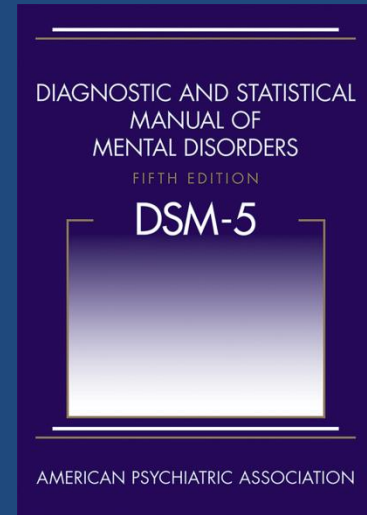
Autism Spectrum Disorders

- Prevalence of ASD is increasing internationally
1/68 in US (2014)
1/58 in US (2016)
- More common in males
4:1



How is ASD diagnosed?

- Based on 2 components
- History
 - DSM 5 criteria
- (standardized) observation
 - Autism Diagnostic Observation Schedule (ADOS-2)
 - Childhood Autism Rating Scale (CARS)
 - others



DSM-5 Autism Spectrum Disorder

A. Social communication and interaction (3 of 3)

1. Deficits in social-emotional reciprocity
2. Deficits in nonverbal communication
3. Deficits in developing, maintaining, and understanding relationships

B. Restricted, repetitive patterns of behavior, interests, etc. (2 of 4)

1. Stereotyped/repetitive motor movements or speech
2. Excessive insistence on sameness, routines, rituals
3. Highly restricted interests (history)
4. Hyper or hyporeactivity to sensory input

C. Symptoms present in early childhood (but may not become fully manifest until social demands exceed limited capacities)

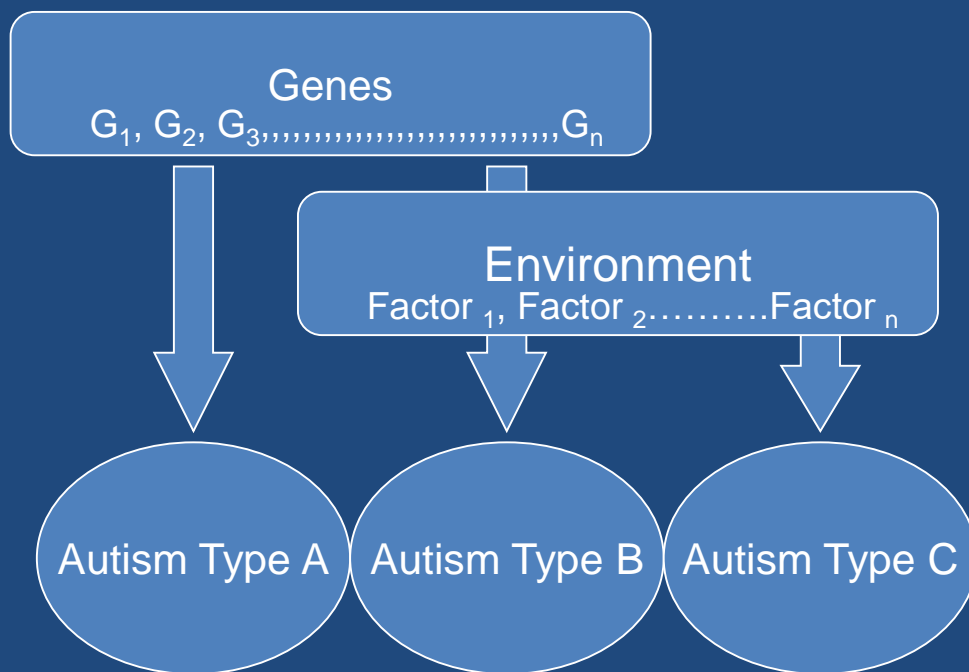
D. Symptoms together limit and impair everyday functioning.

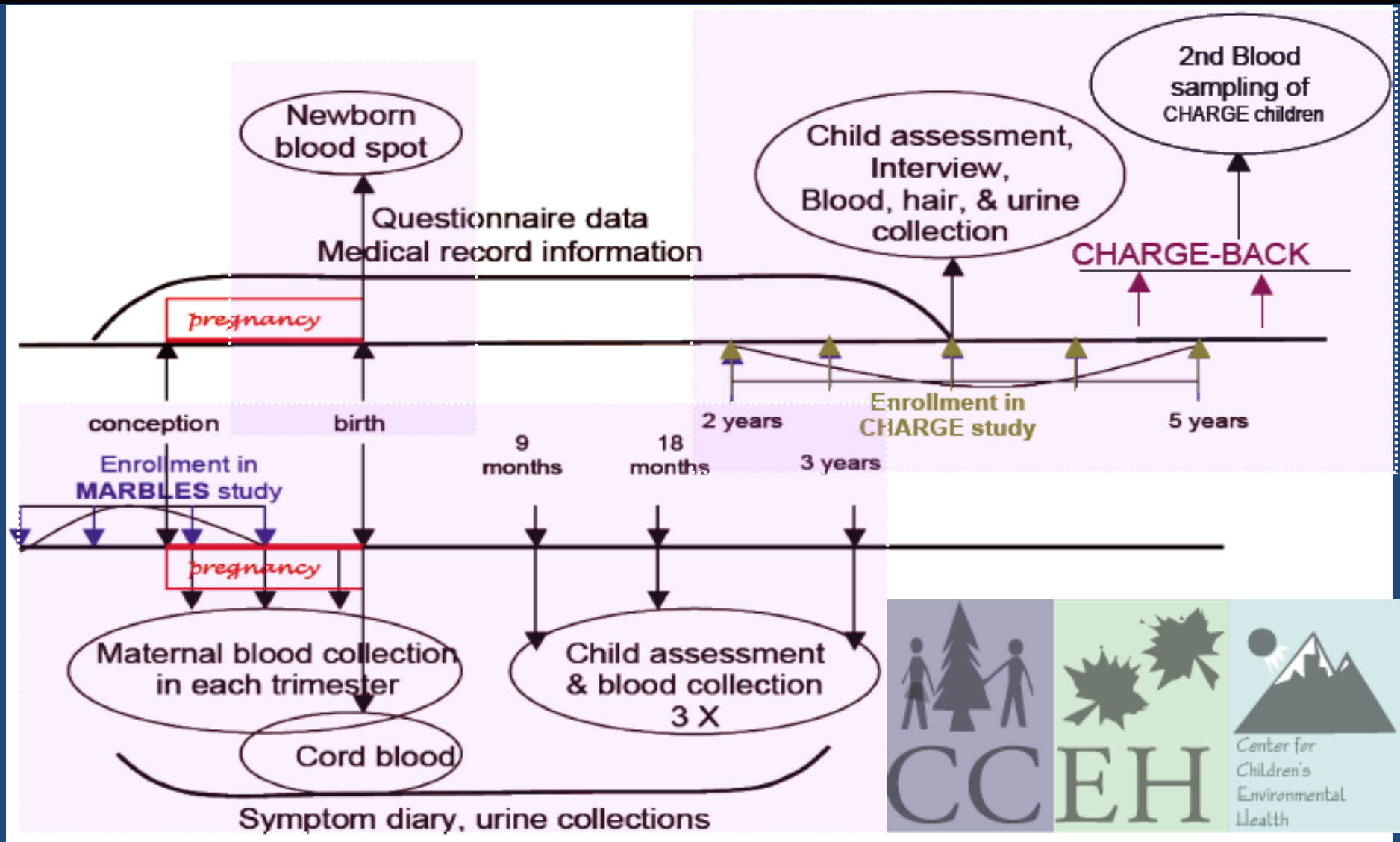
Autism Spectrum Disorders

- ASD are **neurodevelopmental** disorders with a strong genetic component
 - 15-30% risk for siblings of children with ASD
 - 90% risk for monozygotic (identical) twins to be on spectrum
 - Family members with milder but similar deficits, related disorders
- ASD are not caused by poor parenting
- ASD are present across all social classes and racial groups

What Causes Autism?

- First hit - Genetic neurodevelopmental vulnerability
- Second hit - environmental “toxicant” or “stressor”
- Third hit - Restricted development





Pregnancy risk factors

- Maternal obesity and diabetes (during pregnancy) are associated with ASD and ID
- Possible mechanisms:
 - Inflammation
 - Oxidative stress
 - Anti-brain antibodies
- Pre-conception and prenatal folate protective for ASD!



Comorbidities

- Intellectual disability- 40-50%
- Sensory differences
- ADHD
- Learning Disabilities
- Anxiety
- Depression
- Tics/Tourette syndrome
- Genetic disorders- Fragile X, PTEN mutations



Management

- Medical work-up
 - Hearing
 - Physical exam
 - Genetic testing
 - Screen for seizures, sleep, GI problems
 - Assess anxiety, ADHD, learning/intellectual disabilities



Treatment

- Behavioral and educational treatments are most effective for core symptoms of ASD
- Behavioral interventions are most effective when started early and involve parents
- Many evidence based behavioral and educational treatments currently available
 - National Autism Center's National Standards Project/ National Center for Professional Development in ASD
 - CAPTAIN

Practices by Age and Domain

Evidence-Based Practices	Academics & Cognition			Behavior			Communication			Play			Social			Transition		
	E C	E L	M H	E C	E L	M H	E C	E L	M H	E C	E L	M H	E C	E L	M H	E C	E L	M H
1. Antecedent-based Interventions																		
2. Computer Assisted Instruction																		
3. Differential Reinforcement																		
4. Discrete Trial Training																		
5. Extinction																		
6. Functional Behavioral Assessment																		
7. Functional Communication Training																		
8. Naturalistic Interventions																		
9. Parent Implemented Interventions																		
10. Peer Mediated Instruction/Intervention																		
11. Picture Exchange Com. System																		
12. Pivotal Response Training																		
13. Prompting																		
14. Reinforcement																		
15. Response Interruption & Redirection																		
16. Self-Management																		
17. Social Narratives																		
18. Social Skills Groups																		
19. Speech Generating Devices (VOCA)																		
20. Structured Work Systems																		
21. Task analysis																		
22. Time delay																		
23. Video Modeling																		
24. Visual Supports																		

SB946: Insurance Mandate

- effective 2012 July 1
- “behavioral health treatment” is defined as “professional services and treatment programs, including applied behavior analysis and evidence-based behavior intervention programs, that develop or restore, to the maximum extent practicable, the functioning of an individual.” Treatment must be **prescribed by a licensed physician and provided by qualified autism service provider, qualified autism service professional or qualified autism service paraprofessional.**

Health Insurance



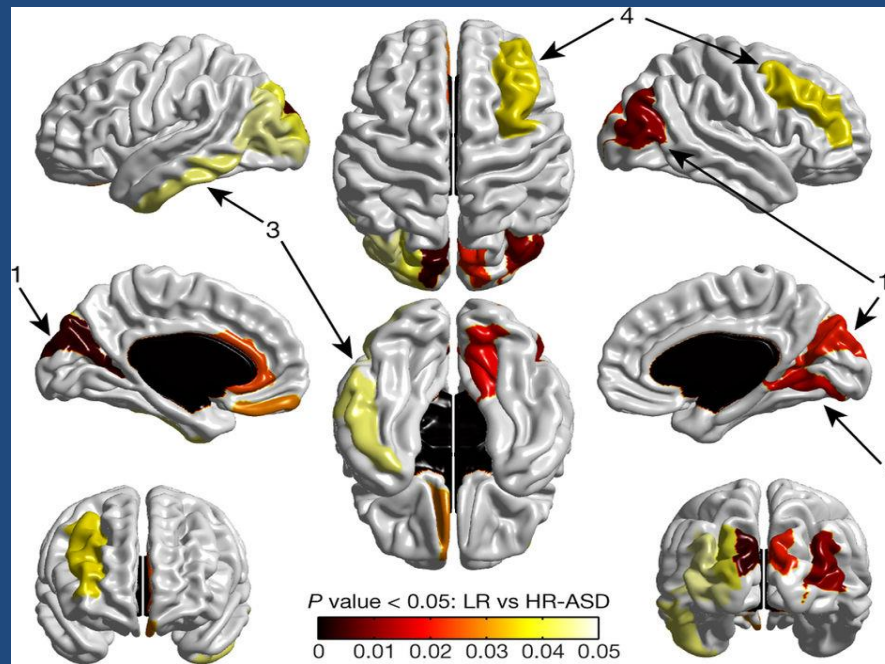
Other treatments for co-morbidities

- Speech therapy
- Occupational therapy
- Feeding therapy
- Medical treatment for seizure disorders, ADHD, anxiety or depression

Hazlett et al. Early brain development in infants at high risk for autism spectrum disorder

- Prospective imaging study to replicate/expand retrospective head circumference studies of brain enlargement in ASD
- 106 high risk ASD siblings and 42 low risk no family ASD hx
- Hyper-expansion of cortical surface area 6-12 months precede brain volume overgrowth observed at 12-24 months in 15 HR infants with ASD dx at 24 months
- Brain volume overgrowth linked to emergence and severity of ASD social deficits
- Deep learning algorithm using surface area information of 6-12 mo images predicted ASD dx at 24 mo with PPV 81% and sensitivity 88%

Hazlett et al.



A map of significant group differences in surface area from 6 to 12 months. The coloured areas show the group effect for the HR-ASD versus LR subjects. Compared to the LR group, the HR-ASD group had significant expansion in the cortical surface area in the left/right middle occipital gyrus and right cuneus (1), right lingual gyrus (2), and to a lesser extent in the left inferior temporal gyrus (3), and middle frontal gyrus (4) (HR-ASD, $n = 34$; LR, $n = 84$).

Early Behavioral Intervention Is Associated With Normalized Brain Activity in Young Children With Autism

Geraldine Dawson, Ph.D., Emily J.H. Jones, Ph.D., Kristen Merkle, B.S., Kaitlin Venema, B.S., Rachel Lowy, B.S., Susan Faja, Ph.D., Dana Kamara, B.S., Michael Murias, Ph.D., Jessica Greenson, Ph.D., Jamie Winter, Ph.D., Milani Smith, Ph.D., Sally J. Rogers, Ph.D., Sara J. Webb, Ph.D.

- Children 18-30 months who received ESDM for 2 years had:
 - Similar brain activity (ERP – event related potentials) and response to faces as typically developing controls
 - Opposite pattern was seen in those who received ASD community treatment

Summary

- ASD is a biologically based disorder
- ASD is diagnosed through behavioral assessments (there are no medical tests to diagnose autism)
- Early intensive behavioral interventions are the most effective treatments available and many are now covered by health insurance

Future research challenges

- Continuing to think broadly about 'environmental' contributors to risk for ASD and DD that may be modifiable
- Continuing collaborative, interdisciplinary research that links clinical and biomedical phenotyping regarding heterogeneity of ASD
- Using gene-environment data to develop targeted biomedical interventions



DSM-5 Diagnostic Criteria for ASD

- A. Persistent deficits in **social communication and social interaction** across multiple contexts, as manifested by the following, currently or by history:
1. Deficits in **social-emotional reciprocity**, ranging, for example, from abnormal social approach and failure of normal back-and-forth conversation; to reduced sharing of interests, emotions, or affect; to failure to initiate or respond to social interactions.
 2. Deficits in **nonverbal communicative behaviors** used for social interaction, ranging, for example, from poorly integrated verbal and nonverbal communication; to abnormalities in eye contact and body language or deficits in understanding and use of gestures; to a total lack of facial expressions and nonverbal communication.
 3. Deficits in **developing, maintaining, and understanding relationships**, ranging, for example, from difficulties adjusting behavior to suit various social contexts; to difficulties in sharing imaginative play or in making friends; to absence of interest in peers.
- All 3 must be met

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DSM-5 Diagnostic Criteria for ASD

- B. **Restricted, repetitive** patterns of behavior, interests, or activities, as manifested by at least two of the following, currently or by history:
1. **Stereotyped or repetitive** motor movements, use of objects, or speech (e.g., simple motor stereotypies, lining up toys or flipping objects, echolalia, idiosyncratic phrases).
 2. Insistence on sameness, **inflexible** adherence to routines, or ritualized patterns or verbal nonverbal behavior (e.g., extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take same route or eat food every day).
 3. **Highly restricted, fixated interests** that are abnormal in intensity or focus (e.g, strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interest).
 4. **Hyper- or hyporeactivity to sensory input** or unusual interests in sensory aspects of the environment (e.g., apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement).
- 2 of 4 must be met